ENGINEERING NEWS.

Tribune Building, New York City.
GEO. H. FROST, PROPRIETOR.

SATURDAY, JANUARY 29, 1881.

WE call special attention to the advertisement (on the last inside page) of Edson's Pressure Recording and Alarm Gauge, used in connection with water or steam pressure.

WE are in receipt of the official report of the proceedings of the annual meeting of the County Surveyors of Ohio, held at Columbus, on the 12th and succeeding days, which we will publish as soon as space will allow. The proceedings of the Michigan Surveyors' Annual Meeting, held at Lansing, on the 12th, we will also publish shortly.

WE call the attention of water-works contractors to the proposals for Pipes, Valves, Hydrants, Stand Pipe, Engines, etc., for the Springfield, Ohio, Water-works, advertised by us on another page this week. That there will be lively competition for so important a water-works construction is inevitable, and we will endeavor to give the results at the earliest possible day.

IF our subscribers wish to have any binding done for them by us, *now is the time*, and now only, as we will not take any orders a couple of weeks hence. The price for binding ENGINEERING NEWS is $1.00 and charges both ways. Also, if any back numbers for 1879 or 1880 are desired, we will fill orders as far as we can during the month of February. After March 1, there will positively not be a single back number of *any* volume except the current one to be had at any price. The price of back numbers is ten cents. The price of the back numbers of the present volume, containing Mr. Clarke's "Iron Bridges of Long Span," is twenty-five cents each, and only a limited number will be sold at that.

OUR readers cannot fail to notice the great increase in railway projects, and the great amount of railway information that is published each week. This great activity in railway building means employment for engineers and contractors, and it is the purpose of ENGINEERING NEWS to present as full a report each week as possible. At the same time we do not pretend to vouch for anything; we take the news from our exchanges, except such as are contributed direct by correspondents, and we endeavor to make it as useful to our readers as possible. We assert without reservation that ENGINEERING NEWS publishes more railway intelligence of direct use to engineers and contractors than any other journal in the world.

THE NEW YORK, ONTARIO AND WESTERN RAILWAY.

This company is now building an extension to its present line, from Middletown to New York. The route will run east to Cornwall-on-the-Hudson and thence south until it strikes the Jersey City and Albany road, which will carry it to New York. This road extends from Stony Point to Jersey City, and has been purchased by the New York, Ontario and Western Company; it will be made double track; the grade will be reduced to twenty-six feet, and steel rails will be laid its entire length.

At this end of the line a tunnel will be built under Bergen Hill, starting from Weehawken and coming out on the Hackensack meadows near New Durham. The tunnel will be four thousand two hundred and twenty-five feet long, twenty-seven feet wide, and twenty-one feet high; the roof will be semi-elliptical. It is anticipated that a short distance will require arching, but for most of the length the native rock will form a support of sufficient strength. The hight of the sub-grade above mean high water at the eastern entrance will be five feet. Toward the west the grade rises thirteen feet to the mile.

There will be five shafts employed in the construction of the tunnel, the one at the eastern portal being one hundred and forty feet in depth: number two, one hundred and forty-five feet; number three, one hundred and sixty feet; number four one hundred and forty feet; and number five, eighty-eight feet. The last mentioned shaft will be at the western entrance, where there will be an approach cut of twenty-seven hundred feet. The cross-section measurements of the shafts will be eight by sixteen feet. Work will be carried on simultaneously on ten faces, electricity being used to light the interior. The contract for this work has been let to Messrs. Smith, Ripley and Coleman of this city, and it stipulates that work must be prosecuted during twenty hours out of every twenty-four, and the whole completed in one year from date of letting.

The approximate quantities are as follows: Excavation in tunnel, eighty thousand yards; in shafts, three thousand yards, and in approaches, one hundred and eighty thousand yards. The tunnel will probably cost three-quarters of a million of dollars.

The entire line from New York to Middletown—seventy-seven miles—has been located and will be constructed as soon as possible. The contract for a tunnel to be built at Haverstraw has been let to Clinton Stevens. The tunnel at West Point, which is about one-half of a mile long, is about one-third done.

Upon the completion of this work the company will have a direct line from Oswego to New York.

The chief engineer of the road is Mr. Walter Katté, member A. S. C. E., his headquarters being at No. 20 Nassau street, this city.

PERSONAL.

Cadet Engineers William S. Smith and Albert O. Young have been ordered to the Adams, Pacific Station.

The President has sent the following nomination to the Senate: Malachi Martin to be Surveyor-General of Florida.

Comptroller Campbell, of New York, has reduced the salary list $67,000, since he came into office a month ago.

Henry C. Potter, General Manager of the Flint & Pere Marquette Railway, was at the Windsor Hotel on Wednesday.

There is a rumor that Colonel Roberts, of Titusville, Pa., contemplates the immediate erection of a free college of mechanical science in that city.

The Chandler Scientific School at Dartmouth has had thus far 279 alumni. There were only four members in the first class, and they received their degree in 1854.

The contract for carrying the United States mails across the St. Louis bridge was awarded to John Cross, of St. Louis, on the 21st inst. His bid, $19,300, was the lowest of 11 received.

J. N. Walker, General Solicitor of the Chicago, Burlington & Quincy Railroad, and formerly President of the company, died in Chicago last Saturday. He was well known in New York and Boston.

Lieut. Commander Lucien N. B. Wyse, of the French navy, and more widely known as connected with interoceanic canal surveys on the Isthmus of Panama, is at the Hotel Brunswick, New York.

The Massachusetts Institute of Technology has at present 335 students. It has ten regular courses of instruction, each taking four years and obtaining the degree of Bachelor of Science. Special laboratories are provided for the instruction of women.

Miss Barbara Scott, of Montreal, has bequeathed $30,000 to found a chair of civil engineering in McGill College; $2,000 for a classical scholarship, to be called "The Barbara Scott Scholarship," and $2,000 to the building fund of St. Gabriel Church, of Montreal.

Professor E. S. Holden, of the Naval Observatory, Washington, who has been appointed to the professorship of the Washburn Observatory, Madison, Wis., is about thirty-five years of age. The place was made vacant by the recent death of Professor Watson.

The partnership heretofore existing between A. H. McNeal and W. E. McNeal, under the firm name of A. H. McNeal & Bro., Burlington, N. J., was dissolved by mutual consent, Jan. 19, 1881. The unsettled business of the firm will be adjusted by A. H. McNeal, who will continue the business.

Major General Frederick William Whinyates, R. E,, of Walton, Cumberland, died recently at Cheltenham, in the 88th year of his age. In 1839 he was commanding officer of Engineers with the field force in New Brunswick when the disputed territory was invaded by the state of Maine.

George H. Allen has been elected City Engineer, of Manchester, N. H., by a convention of the city councils. Mr. Allen is a graduate of the Chandler Scientific School of Dartmouth College, and has been engaged in the practice of his profession in Manchester since 1869, with the exception of some four years in the City Surveyor's Department of Boston.

The death is announced of Mr. Frederick Muller, of Amsterdam—publisher, bookseller and author of a large and elaborate catalogue of Dutch historical engravings to illustrate the history of his country by means of the prints which are contemporary with the events they describe. He had a great knowledge of the literature of geographical discovery.

Kaname Haraguchi, a Japanese civil engineering graduate from the Rensselaer Polytechnic Institute, Troy, N. Y., of the class of 1878, and during the past two years an assistant engineer in the office of the Delaware Bridge Works, of this city, and of the Pennsylvania Railroad, has recently been appointed City Engineer of Tokio, Japan, to which city he returned about December last.

The engineers of the Lesseps canal have signed articles of agreement for three years. The preliminary surveys, relating to the bed of the canal, will take several months. In addition to the first expedition, comprising forty persons, which left on Jan. 6, another batch of twenty engineers left Havre on the 21st, and others will follow by every steamer. The wood required will be brought from New Orleans, but wooden houses and sheds have been ordered from New York.

CORRESPONDENCE.

THE HISTORY OF AMERICAN WATER WORKS.

No. 216 Broadway, New York, Jan. 24.

EDITOR ENGINEERING NEWS:

The Plans and History of the Water-works of the United States you propose to publish, is it to appear in your regular issue, or do you propose it to appear in a separate paper? The plan is a good one. I hope you will succeed in the enterprise.

Resp'y yours, JOHN LOCKWOOD.

[The "History of American Water-works," by J. J. R. Croes, Mem. A. S. C. E., will be published in the regular issue of ENGINEERING NEWS two pages per week, till completed. The matter will be copyrighted, but it will not be electrotyped. Upon

the completion of the publication in ENGINEERING NEWS, if it is considered advisable, the entire matter will be re-set for publication in suitable book form after a thorough revision by Mr. Croes. The magnitude of the undertaking, however, and the care that will be taken to make it as complete a record as possible of water-works statistics, necessarily places the time of final issue in book form out of positive determination.—ED. ENG. NEWS.]

EARTHWORK COMPUTATION.

CLEVELAND, O., Jan. 24, 1881.

EDITOR ENGINEERING NEWS:

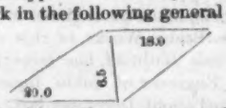
Perhaps it would interest your correspondent who inquires as to narrow-gauge earthwork tables, as well as others of your readers, to understand exactly the scope of my earthwork diagrams, to which you so kindly refer.

The *diagrams of cross sections* give the cubic yards for a solid 50 feet long of any *three-level* section at a single inspection to nearest cubic yard. Adding any two readings together gives the end area volume for a prismoid 100 feet long.

These diagrams are now given for 12, 14, 15, 16, 18 and 20 feet road-beds, 1½ to 1 slopes, and also 18, 1¼ to 1, and 18, 1 to 1. The plates for 12 and 16, 1½ to 1 are an addition to the old edition, but will be sent separate ready for insertion to purchasers of the old edition or others at 50 cents each.

Any one of these diagrams can be used for any road-bed of the same slope by first making a constant addition to each center height (using distances out unchanged), and then subtracting a constant from each reading taken off, before adding the readings together. Doing this for a lot of sections at once, the extra labor is but trifling, but any one who chooses can, by the directions given for construction, draw one for any road-bed whatever in about a day. (It requires the greatest care and accuracy in drawing.)

Irregular three-level sections are preferably taken off first, as if without intermediates, and by then plotting *the surface lines only* a correction is subsequently obtained from the "diagram of triangular prisms" to be added to or subtracted from the original reading. This "diagram of triangular prisms" is applicable to every form of irregular earthwork in the following general manner:



To compute this section, or any number of others numerically, we arrange them as follows:

$$\frac{6.5 \times (20.0 + 18.0)}{2} = 123.5 \text{ sq. ft.}$$

By diagrams—

$$6.5 \;\Big|\; (20.0 + 18.0) \;\Big|\; = 229 \text{ cu. yds.}$$

The first two being the quantities to "enter the diagram" with, and the last the reading taken off, being the volume of a prism of that section 50 feet long.

The "diagram of side-hill cross-sections" gives the proper reading for each part of three-level side-hill sections in the same general manner, precisely as the other diagrams, and for all the road-beds before detailed.

The diagrams for preliminary estimates are general for any road-bed of a given slope. The slopes given are 1½ to 1, 1 to 1 and 1¼ to 1. They give the volume for a section of any center-height, and with either one or two surface slopes per section in such manner that by using an "odometer" (cost $1.50 or $2) the total volume due to any number of such sections may be accurately wheeled off in a gross total. They save an immense amount of labor.

The diagrams of prismoidal correction, and of correction on curves, are general for any road-bed or slope.

The diagram for setting slope stakes (from notes of surface slopes) is drawn for 12, 1½ to 1, but applicable to any other road-bed of the same slope. On ground so regular as to make it expedient, it answers the purpose perfectly and saves much labor. I do not think much of that way as a rule however.

There is also a diagram for computing earthwork by the formula given in Henck's "Field Book," road-bed 18, 1½ to 1. I put it in more as a curiosity than otherwise, to show that even that intractable and laborious method could be "diagramized" so as to make it about as convenient as any. I advise no one to ever use it, although the office work, by the diagram method, amounts to nothing.

A. M. WELLINGTON.

RAILWAY LEGISLATION.

OFFICE OF THE SUPERINTENDENT TRACK, BRIDGES AND BUILDINGS, TOPEKA, KAN., Jan. 21, 1881.

EDITOR ENGINEERING NEWS:

A season of comparative prosperity having dawned upon our country and upon no branch of business more strikingly than railroading, bonded companies that have sought for years some means to liquidate their growing obligations find ground for encouragement in the utmost capacity to which coal and iron mines, rolling mills and rolling-stock manufactories are crowded, in the decrease of our idle floating population, and the increase of immigration, and more directly in the greatly improved showing of net earnings. But there are *some* persons in this vast country who have no capital invested in railroad stocks or bonds who have not known—naturally enough—that these companies of capitalists were constructing, equipping and operating their lines of road to the temporary detriment of their own financial status, giving a stimulus to enterprise—encouragement to manufactories and to everybody—at the same time betterfitting themselves as corporations for the outgrowth of their exertions—the immense traffic of to-day.

They do not think of what has been, when it is noised to them that some road is declaring a dividend to its stockholders.

None but a "soulless corporation" can, even after seven or eight years of embarrassing hardships, pay its first dividend to its stockholders, who have placed their money out of interest to advance the interest of the region it traverses and whose dividends are plunder—the corporation robbing the farmer by taking clean cash out of his pocket to the extent, perhaps, of one-third what it cost him previously to market the same wheat.

Lest railroad owners should at last begin to realize revenue from investments, like other investors, our legal talent proclaims them—though built with private capital—public property.

Why not have done so a few years since and allowed the public to pay equipping and operating expenses and receive in return *no* dividends.

While roads throughout the country of their own accord are reducing tariff rates, and the main business lines—for example, the New York Central and the Pennsylvania—are transporting passengers and freight cheaper than ever before, none more noticeably so than the trunk lines of large mileage, yet we hear from some: "Down with soulless corporations; down with disastrous monopolies."

The anti-monopoly sentiment exists as far west as Kansas, in which state a legislator is known by your correspondent to enter a railroad office, and, laying down an elaborately decorated roll of legal cap, he announces his identity as above, and proceeds to make inquiry as to the number of undulations of grade from one end of the road to the other. He explains: His bill is to divide the roads of the state into three classes, each class to have a maximum tariff fixed by schedule from the Legislature. The object of his interview is to procure data from which to establish "a sort of average grade," and the number of changes from *up* to *down* grade is cheerfully furnished as the *desired* data. From this and similar information from other roads he is to classify into roads of low, medium and high "sorts of average grades," by which classification is to be determined the maximum tariffs. He says he knows nothing whatever about railroads in any aspect, but the grangers in his section, including himself, have become convinced by the large sums of money they are paying the roads, that tariffs are "just about twenty-five per cent. too high," and they "must get a bill through the Legislature to restrict the extorting power of these corporations" and to the "aggregate wisdom" of the assemblage of which he is a member he looks for success. It is not my purpose here to show him that the *number* of undulations of grade bears the same relation to tariff as does the number of stars in the heavens, nor that had he learned what was the maximum grade he would have been no nearer justification in an attempt to thereby restrict rates.

I wish simply to remark the absurdity of the situation. He, a farmer on a homestead. The railroad having laid a branch to his door to accommodate a few, raising the value of his land 200 per cent., and he acknowledging himself under lasting obligation to the company therefor. But a few years later he is sent to make laws and it occurs to that few that because the road will not carry freight over the branch as cheaply per ton-mile as they carry through freight they are robbing that few. They are, probably, robbing everybody else similarly, and so he, for the few, seeks revenge, proposing to make the "grinding monopoly" come down "just about 25 per cent.," and this, he owns, without any knowledge of ratio of earnings of the road to its expenses—an item that had not come up for his consideration; without knowing that the cost to the company of transportation is dependent on a thousand local and temporary circumstances beyond the company's control; without stopping to ask himself if withdrawal of pooled roads to cut is followed by even fair dividends to the withdrawing road; without remembering that of all investments those in railroads pay the least dividends, stock speculation being entirely an outside matter, and finally in apparent ignorance of the fact that the establishment by the State Legislature of a maximum tariff as he proposed three times as great as any existing rates, so as not to be unfair to the present operation of the same, would not produce the reduction of twenty-five per cent., and would not have any effect whatever on any traffic, rates or anything else. I would not cry danger from such men but wish fewer of them were guilty of such bill-infanticides and waste of time.

H. V. H.

NOTES ON THE ACTION OF FURNACES, BOILERS AND STEAM ENGINES.

(*Continued from page* 23.)

III.

FUEL—COMBUSTION.

The principal ingredients of fuel are: Fixed or free carbon; the hydrocarbons, such as olefiant gas, pitch, tar, naphtha, etc.; oxygen, hydrogen, nitrogen and mineral compounds. The following table shows the total heat of combustion with oxygen of *one pound* of each of the substances named in it, in heat units of 7.72 ft. lbs.; and also in pounds of water evaporated from 212° F. These amounts are obtained by dividing the total heat by 966, the quantity of heat required to evaporate one pound of water from 212° F. at atmospheric pressure. It also shows the weight of oxygen required for combination with each pound of the combus-

tible element, and the weight of air, in round numbers, necessary in order to supply that oxygen:

Combustible, 1 lb.	Product.	Lbs. of oxygen per lb. of combustible.	Lbs. air.	Total heat in British units.	Evaporative power from 212°.
Hydrogen	Water	8	36	62,032	Lbs. 64.2
Hydrogen	Steam			53,338	
Carbon	Carbonic oxide	1⅓	6	4,400	4.55
Carbon	Carbonic acid	2⅔	12	14,500	15.0
Olefiant gas		3 3-7	15 3-7	21,344	22.1
Liquid hydrocarbon				21,000 to 19,000	22 to 20
Carbonic oxide gas*	Carbonic acid	1⅓	6	10,100	10.45

*As much as is made by the imperfect combustion of 1 lb. of carbon, viz., 2⅔ lbs.

More heat is theoretically obtained if the steam resulting from the combustion of hydrogen with oxygen is condensed to water, thus setting free the heat of vaporization, than when the product remains steam. It is to be observed that the imperfect combustion of carbon, producing carbonic oxide, gives *less than one-third* of the heat which is yielded by the complete combustion to carbonic oxide gas; but it is further to be noticed that, when the carbonic oxide gas unites with the amount of oxygen, which is necessary to produce carbonic acid gas, the remainder of the heat is generated. If this change takes place in the furnace or flues, the total heat will be the same, as regards the boiler.

The temperature of combustion will be found by multiplying the weight of each product of combustion by its specific heat, and then dividing the total heat units above by their sum. The specific heat of water being unity, the specific heat of oxygen = 0.218, of nitrogen 0.244, of hydrogen 3.405, of steam 0.475, of carbonic oxide 0.248 of carbonic acid 0.216, of air 0.238. Then, for carbon burned in oxygen to carbonic acid gas, the intensity of heat $= \frac{14,500}{3\frac{2}{3} \times 0.216} = 18,308°$ F.; but, if burned in air, and considering the nitrogen, which takes no part in the combustion, we get

$$\frac{14,500}{3\frac{2}{3} \times 0.216 + 9\frac{1}{3} \times 0.244} = 4,725° \text{ F.}$$

= carlorific intensity of combustion of carbon burned in air.

If more air is admitted than is necessary to supply the oxygen, the temperature will be correspondingly reduced.

Similarly, for hydrogen, theoretical temperature of combustion $= \frac{53,338}{9 \times 0.475} = 12,476°$ F. If, however, the hydrogen burns in air, the addition of nitrogen will give

$$\frac{53,338}{9 \times 0.475 + 28 \times 0.244} = 4,802° \text{ F.,}$$

or about the same as for carbon.

As the rapidity of conduction of heat to the water in the boiler depends upon the intensity of the heat, hydrogen does not have that advantage as a fuel over carbon that the total heat units of combustion would indicate. These are maximum temperatures and much exceed any results obtained in the arts, as much heat is lost by access of excess of air, radiation, conduction, fusion of cinders, evaporation of water in fuel, etc.

The total heat of combustion of any one compound of hydrogen and carbon is the sum of the quantities of heat which the hydrogen and carbon contained in it would produce separately by their combustion. We may substitute for the hydrogen in the computation an equivalent quantity of carbon, that is, multiply the weight of hydrogen by $\frac{14,500}{3,405} = 4.28$. If the fuel contains also oxygen, deduct as much of the hydrogen as would form water with the oxygen; for this steam or water will have no effect on the total heat of combustion, as much heat being required to decompose the water as its elements give out in reuniting. Therefore the total heat of combustion of fuel containing carbon, hydrogen and oxygen, for one pound of fuel=

$$14,500 \left\{ C + 4.28 \left(H - \frac{O}{8} \right) \right\},$$

these symbols standing for the weight of each element in the pound of fuel. The evaporative power of one pound of fuel in pounds of water from and at 212°F. is

$$\text{Evap. power} = \frac{\text{heat of comb'n}}{966} = 15 \left\{ C + 4.28 \left(H - \frac{O}{8} \right) \right\}$$

The total heat of one pound of good coal is from 14,000 to 15,000 units.

The number of pounds of air required in order to supply the oxygen necessary for the combustion of 1 lb. of fuel = 12 $C + 36 \left(H - \frac{O}{8} \right)$. For practical purposes the air for one pound coal or coke is 12 pounds; for 1 lb. of dry wood, 6 lbs. More air must be furnished to insure the complete combustion of the fuel in a furnace, as the above quantity is on the supposition that all the oxygen is consumed. For ordinary furnaces with chimney draft the usual allowance is 24 lbs. of air to each pound of coal; for locomotives with blast furnaces with fan or blower, about 18 lbs. of air. With 24 lbs. of air the elevation of temperature is reduced to about 2,500° F. The volume of the furnace-gas resulting may be estimated at 12 cu. ft. per lb. of air for a furnace temperature of 2,500° F., and at 125 cu. ft. for a temperature of 4,700° F.

An insufficient supply of air causes imperfect combustion; with bituminous coal, smoke, and with coke and anthracite, carbonic oxide gas, escapes from the chimney. An excessive supply of air causes waste of heat to an amount corresponding to the weight of air in excess of that necessary for combustion and to the elevation of temperature above the external air at which it is discharged from the chimney.

The following losses occur: waste of unburnt fuel in the solid state; waste of unburnt fuel in the gaseous and smoky states; waste by radiation from furnace and by conduction; loss of heat by hot gas which escapes from the chimney. Waste heat of furnace is from 0.1 to 0.6 of the total heat.

RAILWAYS, ETC., GOSSIP.

The Southeastern Railway Co. of Canada has secured the perpetual lease of the Champlain & St. Lawrence Junction Railway, extending from Stanbridge to Nicollet, Quebec, sixty-five miles. J. H. Wilson, late Vice-President of the N. Y. & N. E. R. R. Co., has been elected President in place of Mr. Hart, resigned.

The House Committee on the Interoceanic Canal has referred back to the sub committee the bill, and report favoring the incorporation of the Eads ship railway across the Isthmus of Panama, with instructions to strike out the provision for an indorsement by the government of its stock to the amount of $50,000,000.

Two amendments to the Government Canadian Pacific Railway Bill, offered by the Opposition, were defeated in the Canadian House of Commons on the 26th, after an all night session.

The interest on Texas Pacific income Land Grant bonds is adjusted but once a year, and judges of railroad securities based on land claim that the bond will soon equal in quality the favorite issues of the Union and Central Pacific roads. Four per cent. cash is bid for the next coupon.

All the Vanderbilt dividends declared in December last are only actually paid on Feb. 1.

The largest transportation earnings per mile reported are from the Pittsburg, Fort Wayne & Chicago—$19,630.09; the smallest on the Louisville, New Albany & St. Louis, $816.11.

Senator Richards and other Ohio lawyers in the Legislature of that State are of the opinion that the American Union Telegraph Company, of Ohio, which was duly incorporated, could not, in leasing its line to any other corporation, transfer any rights, except such as it was entitled to under its charter. There is no law in existance on the statute books of the State which authorizes the consolidation of companies owning parallel lines of telegraph, and no such consolidation can take place, unless authorized by an act of the Legislature. They claim, therefore, that the proposed consolidation of the lines of the Western Union, American Union and Atlantic and Pacific Telegraph companies in that State will be without authority of law, and may be prevented by proper proceedings in the courts.

Mr. Charles Francis Adams, Jr., has been giving a lecture on "The Turpins of the Rail." It is described as a series of thrilling anecdotes of railroad criminalities, told with considerable power and humor. He related one ludicrous story of a Bostonian, who, while traveling in a compartment car with an elderly couple, in England, became alarmed at seeing one of them draw out a bottle and a napkin, after whispering together and casting frequent glances toward him. He became possessed with the idea that their intention was to chloroform and rob him, and, by his outcries, created considerable excitement in the train until his traveling companions, who at first thought him a lunatic, because of his excited manner, had an opportunity to explain that the bottle which so alarmed him contained only a supply of spirits, with which they had proposed to regale themselves.

Before the New York Bullion Club, on the evening of the 25th, L. E. Chittenden delivered an address on the need of railways in Nevada. He said that a stranger going to Nevada for the first time think: that he has reached a desert; and such it is in a popular sense. It is a volcanic, waterless, treeless country. It is larger in area than New York, and although it contains only 62,000 inhabitants, including Chinese, Indians and foreigners, yet it has, possibly, within its boundaries as much material wealth as any State in the Union, not excepting the Empire and Keystone States. The Sierra Nevada Mountains on the west are high enough to intercept the moisture of the clouds, causing it to fall as rain on the west side of the range and promoting the growth there of perhaps the most remarkable forest in the world. In company with some shipbuilders of Maine, Mr. Chittenden traveled through this forest and measured pines 275 and 300 feet high, with a diameter of 9 feet, carried upward 150 feet. The rivers do not empty into the sea, but rise and sink within the State; they are largest at their sources and gradually narrow till they disappear. It is the centre of the mineral deposits of the world, but railways must be built to enable the mines to be operated. At present labor is very dear, and in some localities water costs 5 cents a gallon and wood $22 a cord. The speaker described the roads that have been projected, and showed how necessary they are to the development of the mineral resources of the State.

Sterling, Ill., has completed a fine iron bridge across Rock River and will in the spring erect an elegant building for city purposes.

It is reported the Peoria & Northern Railroad will be built the coming year, crossing the Chicago & Northwestern Railroad at that place, and intersecting the Chicago, Milwaukee & St. Paul Railroad at Mount Carroll, thus opening up the immense coal fields north of Peoria, and giving an outlet over the vast lines of the latter railroad.

The water-power at Sterling is immense, and there is plenty of room for all kinds of manufactories.

Just twelve months from the date of the order given for its construction, the first division—twenty-three miles—of the railroad in Yeso, the northern island of Japan, was opened to traffic, and trains are now run daily at a profit. The line is from Otarunai Harbor, on the west coast, via Lapparo, the capital, to Paroni coal fields. It cost $20,000 per mile, which includes rolling stock, motive power, machinery for terminal repair shops, etc. The English line built between Tokio and Yokohama cost nearly $200,000 per mile, and it took five years to complete eighteen miles. The Japanese officials are greatly encouraged by the prospect of an American system of rapid transportation. This is the first American railroad in Asia, and was constructed under the direction of Joseph M. Crawford, a Pennsylvanian, all of whose assistants are Americans.

Capitalists representing $16,000,000 are about to lease the Cincinnati Southern Railroad, paying out of the first profits 4 per cent. on the stock and 4 per cent. on the city's investment of $18,000,000. Excess of net earnings is to be divided *pro rata* until the city's portion reaches 7 per cent., when the surplus shall be divided equally. It is proposed to form a pooling arrangement with the

Kentucky Central, Chesapeake & Ohio, and the Erlanger lines from Chattanooga.

An old mountaineer visiting Sacramento, and unacquainted with street cars, dropped a whole dollar into the box and was astonished to learn that he could not get it out. The *Bee* says: "Finally he solved the problem of getting even with the railroad company by notifying the driver that he would use up the money he put in the box in rides. This he did by remaining in the car for 90 trips, and, armed with a flask of whisky and a lunch of crackers and cheese, the old fellow had a picnic all to himself."

ENGINEERS' SOCIETIES.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

At the meeting of the Society on Wednesday evening, 19th inst., Mr. Geo. M. Copeland, of Brockton, Mass., who is "not an Engineer" as he took care to inform those present, submitted a model of an inter-oceanic ship railway, the track for which was to be laid on an arc of a great circle, regardless of the difficulties arising from surface inequalities. The general opinion of members present was not favorable to Mr. Copeland's device.

WESTERN SOCIETY OF ENGINEERS.

At the 120th regular meeting, to be held in Chicago on Tuesday, February 1, at 4 P. M., a paper will be read by R. Ralston Jones: "The Hydraulic Machinery Applied to Operating the Lock Gates of the Des Moines Rapids Canal."

It is expected that a copy of Volume V. of the Transactions of the Society will be mailed to each member during the present month.

L. P. MOREHOUSE, Secretary.

ENGINEERS' CLUB OF PHILADELPHIA.

The regular meeting of the Engineers' Club of Philadelphia was called to order on Saturday evening, the 15th, by President Strickland Kneass, twenty-six members and three visitors present. Mr. Charles A. Ashburner, chairman of the Committee on Information, presented a paper upon the progress and methods of the Pennsylvania State geological survey. Forty-eight counties have been entirely completed, eighteen counties partially surveyed and seven counties remain to be surveyed. The Board of Commissioners estimate that it will require three years to complete the survey of the entire State. He also read notes on mine topography, in which a new method was proposed for determining the area of the available coal in the anthracite region, and cited an instance in which the hypothesis of the method had been sustained by after developments. He also exhibited a complete set of specimens of the crude and refined petroleums from Barku, Galicia, and other European fields, recently received through Hon. Lewis Emery. He also presented a paper, by Col. James Worrall, member of the club, upon the routes and methods which have been proposed for crossing the isthmus. The Panama, Nicaragua and Tehuantepec canal routes and the ship railroad of Captain Eads were treated, forming a paper too comprehensive to be fairly treated in a short abstract.

Mr. T. M. Cleemann read a paper on the strength of wrought-iron columns, showing that the accepted formula of Rankine and Gordon gives imperfect results, and urging the necessity of further experiments on various shapes in order to complete it and render it more exact. Professor L. M. Haupt read a paper on intercommunications in cities, showing the great value of increased facilities of travel, and applied them specially to Philadelphia. The number of persons using the horse cars during the last year was about one hundred million, and the value of a saving of one mile in distance, and its equivalent in time and power, was computed upon this basis, with some surprising results. The paper was limited to a consideration of the street system only, the railroad system being reserved for the future. The paper contained some valuable suggestions as to important proposed improvements.

Mr. Henry G. Morris exhibited a photograph of a machine designed by Mr. William S. Anchincloss which, it is claimed, will solve problems in alligation, direct and inverse proportion, right angled triangles, circles, ellipses, square root, speed of shafting, diameter of pulleys, etc.

The standing committees of the board of directors for 1881 were appointed as follows: On Finance—Messrs. Frederic Graff and J. J. de Kinder. On Membership—Messrs. J. J. de Kinder and Geo Burnham, Jr. On Publication—Messrs. Rudolph Hering and Geo. Burnham, Jr. On Library—Messrs. T. M. Cleemann and Frederic Graff. Howard Murphy, Corresponding Secretary.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.

The first annual meeting of the Engineers' Society of Western Pennsylvania was held on the evening of the 18th, in the Art Gallery of Library Hall, Pittsburgh, President William Metcalf in the chair. The minutes of the last meeting were read and approved, as were also the minutes of the last annual meeting.

Treasurer William Kent submitted his annual report which showed the receipts of the Society for the past year to have been $804, and the expenditures for the same period, $784.85, leaving a balance of $19.15.

Mr. J. H. Harlow, Secretary, read his report for the year, from which the following very brief account of the Society and its works are taken:

Dec. 18, 1879, a preliminary meeting was held in the office of the City Engineer of this city to take such action as was deemed best in relation to the formation of an engineers' society. At this meeting there were forty present. After some discussion as to the necessity of such a society, a committee was appointed to draft a constitution and a set of by-laws. On the sixth of January, 1880, another meeting was held, at which this Society was organized under the name of the Engineers' Society of Western Pennsylvania. The first regular meeting of the Society was held Jan. 20, 1880, and since that time regular meetings have been held the third Tuesday of each month. The membership of the Society one year ago was one hundred and ten, it is now one hundred and ninety, and the average attendance has been fifty-one. During the year interesting and instructive papers have been read upon a variety of subjects, touching engineers and their work. With one exception, these papers have been published and distributed among the members. The Society has taken a prominent position in the rank of local societies, and some of its papers have been in high demand. Requests for papers have been received from Austria, Sweden, England and Buenos Ayres. In return for its papers, the Society has received papers read at, and the proceedings of, all the principal American societies of engineers, as well as some valuable papers from many foreign societies. A charter was granted the Society March 20, 1880. During the early part of the year the Society, through the courtesy of the Western Iron Association, met in its rooms. But June 15, 1880, arrangements were made with the Pittsburg Library Association that by the payment of $400 per year the use of the Art Gallery was granted for nine monthly meetings, and the free use of the library, by members of this Society. The $400 is to be expended by the Library Association in conjunction with this Society in the purchase of scientific books and periodicals.

Captain F. A. Mahan, Chairman of the Library Committee, read a report of that committee, which recommends that the southeast corner of the Library be chosen as the location of the Engineer's Department. The report stated that some three hundred and fifty publications had been recommended, that suitable selections would be made and that the periodicals selected would soon be found upon the tables of the Society. He stated that a contribution of $1,000 had been received from Mr. Wm. Thaw and a like sum from other parties, for the founding of a library. Each member of the Society has the full privilege of the library.

A vote of thanks was returned to Mr. Thaw.

President W. Metcalf then read a highly entertaining report, of which a short synopsis is given:

When the organization of such a society as this was proposed it was thought that about twenty or thirty engineers could be got together, and that probably as many more persons not engineers might be induced to join, just to help the movement. Small, pleasant meetings, an occasional paper read and a good deal of friendly intercourse, were about all that was expected to be accomplished by the projectors. These expectations have been far surpassed. Twelve papers have been read at the meetings, and it may be said of them in general that their character have been high. Some of them have been republished in periodicals in this country and in Europe. What we need for our own benefit, and indeed, gentlemen, what we must have if we are to hold together and keep up the interest in our proceedings, are more short, informal papers, more of our own experiences, and more of free discussions, and less formality. Allow me to say, gentlemen, that you are the best behaved set of gentlemen than any one ever presided over. Not once has the presiding officer had a chance to assert his authority; not once has the gavel fallen in just indignation at some breach of decorum, either in speech or manner; not once has an august presidential frown been necessary to quell some rising disturbance. This is all very admirable. Harmony is perfectly lovely. But we ought not to be so solemn about it. You display the well-known modesty and retiring manner of the average engineer to such perfection that you really are in danger of making your proceedings dull. This is not fair to the presiding officer; it does not give him a chance to wield the power which he prizes so highly. You will remember that this is the address of the retiring president, and that he is now speaking for the benefit of his successor. But seriously, this over-formality or over-modesty in our meetings is all wrong. A member spends much time and care in preparing an admirable paper; he is listened to with interest, duly applauded when through, and then takes his seat, expecting an interested and interesting discussion, and has crammed himself ready to answer every question. An awful pause ensues, and then follows a series of flirtations between the Chair and the over-moved members, the Chair coaxing and making sheep's eyes all over the vast assembly, and the coy ones all holding down their heads and listening. These remarks would not be fair if it were not a fact that often those silent ones were fairly exploding with questions, objections and arguments, and no sooner is the magic word "adjourned" pronounced than the air fairly resounds with this bottled up intelligence which the whole meeting ought to have enjoyed. The President compliments the Society on its very smooth and satisfactory working for the past year; states that a long list of technical periodicals suggested by the Society will soon be found upon the library table for the use of all, and thanks the Library Association for their courtesy to the Society. A very humorous description of the excursion which the Society enjoyed (was to have) last summer through the State of West Virginia, visiting all the celebrated mines and fashionable watering places, and returning by the way of Washington, all for one dollar, was given. The attention of the Society is then turned to the need of the Society and the city for a technical library, and the information given that a donation of $1,000 from Mr. Wm. Thaw, and $1.000 from other parties, has been secured for that purpose, and that soon a respectable beginning for a library will be made. A vigorous call for money for this purpose is made. Reference is then made to the death of Mr. Andrew Kloman, who has been the only member of the Society carried away by death. The President pronounced a high eulogy upon the character of Mr. Kloman. His life was held out as a model for young men, and as an example of the fact that "the sure road to high character, substantial success, and thorough independence runs straight through the workshop, and not through the office." [Applause.]

After the reading of the President's report an election of officers for the ensuing year was held, with the following result: President, Wm. Metcalf; Vice-President, Thomas Rodd; Directors, Samuel Diescher, Francis Phillips; Treasurer, A. E. Frost; Secretary, J. H. Harlow.

Upon motion of Mr. Park, City Engineer Dempster made a brief reply to the address of President Metcalf. Mr. Dempster was followed by Mr. Miller and several other gentlemen in brief, witty and eulogistic addresses upon the President.

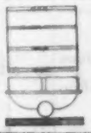
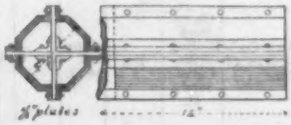
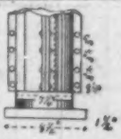
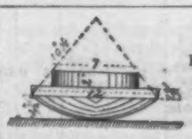
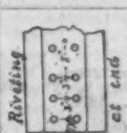
The subject of holding a tea party for the advancement of the social relations of the members of the Society was discussed, and Messrs. Park, Dempster, Ackenheil and Metcalf were appointed as a committee to make arrangements for the holding of such a party.

Ways and means of establishing and enlarging a library were discussed at considerable length, and several very valuable suggestions were made and the Library Committee directed to act upon them.

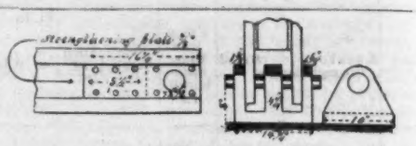
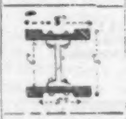
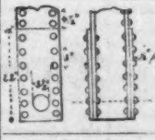
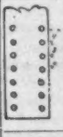
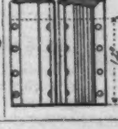
The Society then adjourned.

The engineers have just completed the final location of the Knoxville extension of the L. & N. R. R., from Livingston, Ky., nine miles out, and the contractors are making energetic preparations to push the work as fast as possible, as the 18 miles between Livingston and London are to be completed by Aug. 1, 1881. One party of Engineers are at work locating the line from London to Williamsburgh. In a few days another party will be put on from Williamsburgh to the Tennessee state line where they will be met by a corps of Knoxville and Ohio R. R. engineers. C. L. Cornwell is resident engineer.

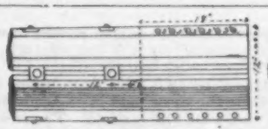
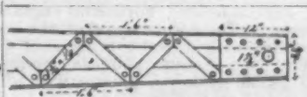
EXPERIMENTS ON WROUGHT-IRON COLUMNS.

No.	KIND OF COLUMN.	Iron, where rolled.	Tests, where made.	Date of test.	Length of column.	Sectional area in square inches.	Middle section and diameter.	Distance from center of rivets.	Pressure per sq. inch producing permanent set, in lbs.	Pressure per sq. inch causing fracture in lbs.	Modulus of elasticity.	REMARKS.
					Ft. In			In.				
1....	Keystone, riveted through flanges.	Union Iron Mills, Pittsburgh, Pa.	Pittsburgh, Pa.	April 19, 1875.	0 9	14.25		5	40,000 Commenced buckling between rivets.	51,500 Plates buckled.	.....	Planed at both ends.
2....	Keystone riveted diametrically between flanges. Column swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	April 19, 1875.	5 0	14.25		15	.....	33,000 Broke by buckling between rivets.	.....	Fitted with square castings and bolted at ends.
3...	Keystone, riveted diametrically between flanges. Column swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	April 19, 1875.	15 0	14.84		15	.....	28,000 Broke by deflection.	.....	Same as above. Diameter 0.25 inches at ends.
4....	Keystone, riveted diametrically between flanges. Column swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	April 20, 1875.	27 0	12.90		15	16,700	24,130 Broke by deflection.	.....	Same as above. Diameter 9.2 inches at ends.
5....	Keystone, riveted diametrically between flanges. Column swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	April 21, 1875.	27 0	13.12		15	15,000	22,000 Broke by deflection.	29,500,000	 Square castings at ends with flanges fitting on a pin, the whole length of the latter bearing against an abutting casting. Diameter of column at ends = 9.22 inches.
6....	Phœnix, riveted through flanges.	Phœnixville Pa.	Do.	April 27, 1875.	15 0	14.09		6	35,000	37,500 Broke by deflection.	27,400,000	Column planed at both ends. No shoes.
7....	Keystone, riveted through flanges.	Union Iron Mills, Pittsburgh, Pa.	Do.	April 27, 1875.	15 0	14.62		6	17,500	30,000 Broke by deflection.	23,800,000	Column planed at both ends. No shoes.
8....	Keystone, riveted diametrically between flanges. Column swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	April 28, 1875.	15 0	14.8		15	15,000	36,900 Broke by buckling between rivets.	29,600,000	 Ends riveted with cross plates and angle irons, and planed.
9...	Keystone, riveted through flanges. Column not swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	April 28, 1875.	15 0	23.67		6	19,000	32,000 Broke by deflection.	24,700,000	Column planed at both ends. No shoes.
10....	Phœnix, riveted through flanges.	Phœnixville Pa.	Chicago, Ill.	June 2, 1875.	27 0	13.7		6	18,000	31,000 Broke by deflection.	29,100,000	 Column fitted with square castings at ends, and last four rivets spaced 3 inches from center to center.
11....	Phœnix, riveted through flanges.	Phœnixville Pa.	Do.	June 2, 1875.	27 0	13.80		6	17,000	21,700 Broke by deflection.	27,100,000	 Ends closely riveted as above and fitted with castings having spherical abutting surfaces.
12....	American Bridge Co.	Cleveland Rolling Mills, Cleveland, O.	Do.	June 2, 1875.	20 0	20.1		8	15,000	Column discovered not to fit well, and trial discontinued at 19,000	20,200,000	 Ends planed to fit squarely on abutting casting.

EXPERIMENTS ON WROUGHT-IRON COLUMNS.—*Continued.*

No.	Kind of Column.	Iron, where rolled.	Tests, where made.	Date of test.	Length of column. Ft.	In.	Sectional area in square inches.	Middle section and diameter.	Distance from center to center of rivets. In.	Pressure per sq. inch producing permanent set, in lbs.	Pressure per sq. inch causing fracture, in lbs.	Modulus of elasticity.	Remarks.
13...	American Bridge Co.	Cleveland Rolling Mills, Cleveland, O.	Chicago, Ill.	June 2, 1875.	26	0	25.05		8	12,600	24,000 Broke by deflection downward.	30,400,000	 Pin ends.
14...	American Bridge Co.	Cleveland Rolling Mills, Cleveland, O.	Do.	June 3, 1875.	26	0	20.72		8	14,000	22,000 Broke by deflection sideways.	26,000,000	Pin ends as above.
15...	American Bridge Co.	Cleveland Rolling Mills, Cleveland, O.	Do.	June 3, 1875.	30	0	14.97		8	13,000	23,700 Broke by deflection sideways.	28,000,000	Ends planed and riveted as for No. 12. Column balanced at center with 500 lbs.
16...	American Bridge Co.	Cleveland Rolling Mills, Cleveland, O.	Do.	June 3, 1875.	20	0	12.5		8	15,000	26,700 Broke by deflection sideways.	28,900,000	Pin ends as for No. 13.
17...	American Bridge Co.	Cleveland Rolling Mills, Cleveland, O.	Do.	June 3, 1875.	20	0	19.9		8	12,000	26,500 Broke by deflection sideways.	23,100,000	Pin ends as for No. 13.
18...	American Bridge Co., same column as for No. 12.	Cleveland Rolling Mills, Cleveland, O.	Do.	June 3, 1875.	20	0	20.1		8	23,000	31,500 Broke by deflection.	23,000,000	Ends planed and riveted as for No. 12.
19...	American Bridge Co.	Cleveland Rolling Mills, Cleveland, O.	Do.	June 3, 1875.	27	0	20.1		8	24,000	27,800 Broke by deflection upward.	32,900,000	Ends planed and riveted as for No. 12.
20...	American Bridge Co.'s strut for girders of iron viaducts.	Cleveland Rolling Mills, Cleveland, O.	Do.	June 3, 1875.	10	0	9.66		..	8,000	20,000 Broke by deflection downward.	21,600,000	Pin ends as for No. 14.
21...	Louisville Bridge Co.'s square column: 2 channel bars and 2 plates, riveted.	Ohio Falls Iron Works, New Albany Ind.	Do.	June 29, 1875.	25	9	13.6		4½	18,000	25,500 Broke by deflection sideways.	31,000,000	 Pin ends. Castings as for No. 14. Column balanced with 300 lbs. at center.
22...	Louisville Bridge Co.'s square column: 2 channel bars and 2 plates, riveted.	Ohio Falls Iron Works, New Albany Ind.	Do.	June 29, 1875.	26	0	13.6		4½	20,000	30,000 Broke by deflection upward.	27,800,000	 Ends planed and closely riveted. Column balanced at center with 300 lbs.
23...	Baltimore Bridge Co.'s square column: 2 channel bars and 2 plates, riveted.	Pencoyd Iron Works, near Philadelphia Pa.	Do.	June 29, 1875.	24	0	13.7		4	15,000	33,200 Broke by deflection downward.	28,900,000	Column twisted before test 7-16 inch. Ends planed and closely riveted. Plates buckled. Column balanced at center with 300 lbs.
24...	Keystone, riveted diametrically between flanges. Column not swelled.	Union Iron Mills, Pittsburgh, Pa.	Pittsburgh, Pa.	July 2, 1875.	27	0	19.2		12	15,000	25,000 Broke by deflection sideways.	26,500,000	 Ends fitted with diagonal plates and planed.

EXPERIMENTS ON WROUGHT-IRON COLUMNS—*Continued.*

No.	KIND OF COLUMN.	Iron, where rolled.	Tests, where made.	Date of test.	Length of column.	Sectional area in square inches.	Middle section and diameter.	Distance from center to center of rivets.	Pressure per sq. inch producing permanent set, in lbs.	Pressure per sq. inch causing fracture, in lbs.	Modulus of elasticity.	REMARKS.
					Ft. In.			In.				
25....	Keystone, riveted diametrically between flanges. Column swelled.	Union Iron Mills, Pittsburgh, Pa.	Pittsburgh, Pa.	July 3, 1875.	27 0	18.83		12	12,000	21,100 Broke by deflection downward.	28,100,000	Fitted with square castings and bolted at ends.
26....	Keystone, riveted diametrically between flanges. Column not swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	July 3, 1875.	27 0	14.49		12	17,000	27,500 Broke by deflection downward.	27,500,000	Ends as for No 25.
27....	Keystone, riveted through flanges. Column not swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	July 3, 1875.	27 0	18.83		12	18,000	27,800 Broke by deflection downward.	23,700,000	Ends planed. Iron of column soft and badly welded in rolling.
28....	Phœnix, riveted through flanges.	Phœnixville Pa.	Do.	Aug. 5, 1875.	28 0	13.58		6	22,000	34,800 Broke by deflection downward.	25,700,000	Ends planed. Last five rivets at both ends spaced 3 inches from center to center. Balanced at center with 650 lbs.
29....	Phœnix, riveted through flanges.	Phœnixville Pa.	Do.	Aug. 5, 1875.	28 0	13.58		6	? 18,000	36,000 Broke by deflection upward.	28,500,000	Ends planed and riveted as for No. 28. Column balanced at center with 650 lbs.
30....	Keystone, riveted diametrically between flanges. Column not swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	Aug. 5, 1875.	27 0	15.13		12	12,000	30,000	19,300,000	 Ends planed. No shoes.
31....	Keystone, riveted diametrically between flanges. Column swelled.	Union Iron Mills, Pittsburgh, Pa.	Do.	Aug. 5, 1875.	27 0	15.13		.....	16,000	25,400	23,600,000	Ends as for No. 30.
32....	Keystone, square column, 2 channel bars and 2 plates, riveted.	Union Iron Mills, Pittsburgh, Pa.	Do.	Aug. 26, 1875.	27 0	26.05		6	15,000	30,200 Broke by deflection sideways.	30,100,000	Column planed at both ends. No shoes.
33....	American Bridge Co.'s latticed strut for iron trestles.	Cleveland Rolling Mills, Cleveland, O.	Do.	Nov. 22, 1875.	28 6⅞	4 angle irons 5.68		18	21,100	31,700 Broke by deflection upward.	32,400,000	 Angle-irons fractured at one end near plates, and near middle of strut. Angle-irons 2¼ × 2¼ inches. End plates ¼ inch thick.
34...	Louisville Bridge and Iron Co.'s strut.	Ohio Falls Iron Works, New Albany Ind.	Chicago, Ill.	Dec. 4, 1875.	12 3	6.00		15¼	16,000	17,600 Broke by deflection upward.	.....	Flat ends. Dotted lines show manner in which column gave way.

PETERBOROUGH (ENG.) SEWERAGE WORKS.

The sewerage works just completed for the corporation of the city and borough of Peterborough involved the construction of thirteen miles of brick and pipe sewers, with the necessary manholes, ventilators, flushing arrangements, and penstocks; the construction of duplicate tanks for the straining of the sewage at the outfall, and two miles of concrete carrier; the preparation of 96 acres of land out of a farm of 300 acres purchased by the corporation for the utilization of the sewage by irrigation; the erection of two pumping stations, with the necessary machinery; and the erection of two cottages. The sewage from all parts of the borough is brought together and discharged at one outfall. It is conveyed by the water-carriage method on the separate system.

As about seven-eighths of the entire population of the borough dwell on the north side of the River Nene, it is consequently in this portion that the largest and most costly sewers are constructed; but the peculiar situation of the southern district renders the conveyance of the sewage to a suitable outfall a matter of considerable difficulty.

The borough on the south side of the river is drained by 3¼ miles of stoneware pipe sewers, and the sewage brought to the river side, whence it is carried in an iron pipe sewer under the river and across the wash lands. After passing under the protection bank of the North Level it is emptied into a tank sewer, devised for the reception of the sewage during the time the pumping engines are at rest. It then flows into the wells of the southern outfall pumping station, and is pumped into the gravitation main close to the outfall.

The borough on the north side of the river is drained by 9¾ miles of brick and pipe sewers. The northern arterial main is a brick sewer, egg-shaped in section, of 3 ft. by 2 ft. internal diameters, and 3,670 yards long. The main intercepting brick sewer is 1,235 yards long, and comprises 149 yards of 3 ft. by 2 ft. egg-shaped, 612 yards of 2 ft. 9 in. by 1 ft. 10 in. egg-shaped, and 474 yards of 2 ft. barrel sewers.

These sewers discharge into a barrel culvert, 3 ft. 4 in. in diameter, and 508 yards long, which empties into a pen-stock chamber; from thence

SUPPLEMENTARY TABLE OF GIRDER BRIGDES, CONSTRUCTED OF IRON, FOR RAILWAYS.*

Spans exceeding 300 feet.

Number.	Date of Erection.	Where Built.	Name of Engineer.	Clear Span in Feet between Points of Bearings.	Tons of Iron (2,240 lbs.).	Dimensions in Feet.					Loads in lbs per Lineal Foot.		Strains in lbs. per Square inch of Area.				Test Load.	Centre Deflection.	Dead Load of Iron, Timber, &c.	Deflection of Span from its own Weight on removal of Scaffolding.	Remarks.
						Width between Centres of Girders.	Panels.				Dead Load of Iron and Timber in Track.	Live Load of Engines and Cars.	Tensile.		Compressive						
							Number.	Length.	Height.				From Constant Load only.	From Total Constant and Moving Loads.	From Constant Load only.	From Total Constant and Moving Loads.					
						Ft. In.		Ft. In.	Ft. In.								Tons.	Inches.	Tons.	Inches.	
1	1870	Zeglin River, Stettin	Schröder	302	449	27 3	17	19 8	19 8 / 45 11		3,333	4,024	.....	10,667	.....	10,667	... ...	....	.....	.....	Double track.
2	1869	Mersey River, Runcorn	W. Baker	305	702	28 0	Lattice.		27 0		5,667	3,360	6,618	10,416	4,883	7,795	341	1¼	... ...	.....	All wrought iron— Estimated camber 9 in. Actual " 9½ "
3	1872	Rhine River, Rheinhausen	Hartwich	317	.....	.....	.....	.....	.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	1870	Memel River, Tilsit	Schwedler	317	604	28 10	18	17 7	17 0 / 39 1		4,700	5,097	.....	10,667	.....	10,667	.....	.....	.....	.....	Double track.
5	1873	Vistula River, Thorn	Schwedler	319	605	37 9	18	13 6 / 18 3	24 7 / 46 2		4,252	4,830	.....	10,383	.....	10,383	.....	.....	.....	.....	Double track.
6	1869	Elb River, Hamburg	Lohse	325	602	27 6	28	12 4	10 3		4,144	4,830	.....	10,667	.....	10,667	.....	.....	.....	.....	Double track.
7	1874	Elb River, Totschen	Gerlich	328	420	16 5	20	16 5	32 10		2,864	2,683	.....	11,378	.....	11,378	354	1 53-100	.....	.....	Single track. *
8	1872	Rhine River, Wesel	Dreling	334	.....	27 5	28	12 4	18 5 / 37 0		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Double track.
9	1875	Elb River, Hohnsdorf	Grüttefien	338	592	27 3	20	17 8	23 7 / 49 3		4,292	4,830	.....	.....	.....	.....	.....	.....	.....	.....	Double track
10	1870	Maas River, Crèvecœur	..	341	512	16 8	23	14 7	23 0 / 41 0		3,455	2,109	6,000	9,598	6,000	9,598	321	1 4-25	527	.....	
11	1864	Old Rhine River Griethausen	Hartwich	342	493	15 0	40	8 4	25 3		3,413	2,140	.....	10,383	.....	10,383	214	1 53-100	.....	.....	Single track.
12	1870	Theiss River, Algyo	Körösi	342	452	16 5	20	17 0	34 2		2,958	2,132	.....	11,378	.....	11,378	312	1 38-100	.....	.....	Single track.
13	1870	Rhine River, Mayence (New)	Pauli	345	352	15 1	13	26 3	0 0 / 49 3		2,455	2,146	5,689	11,378	5,689	11,378	.....	.....	.....	.....	
14	1870	Rhine River, Düsseldorf	Pichler	347	619	28 0	27	12 4	22 7 / 44 5		4,239	4,272	... ..	10,383	.....	10,383	.....	.....	.....	....	Double track.
15	1878	Rhine River, Coblence (New)	Hilf	348	.....	.. ..	.....	.....	.....		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
16	1871	Hollandsch-diep River, Moerdyk	A commission.	349	447	16 5	25	14 6	19 8 / 39 8		3,212	2,222	5,042	8,533	5,042	8,533	336	1¼	486	.....	
17	1869	Wall River, Bommel	G. van Diesen.	408	860	17 2	27	14 11	23 0 / 42 7		4,412	1,935	6,378	9,243	6,378	9,954	352	1 8-25	816	... ...	

* Since the paper was read information relating to other iron bridges of large span has been supplied to the Secretary, from which the following Table has been compiled.

the sewage is taken by two 24 in. iron pipes, laid side by side, and for the most part in embankment, to the straining tanks at the outfall. The sewage from the districts north of the river flows directly on to the irrigation area by gravitation.

The geological formations through which the trenches were excavated are principally members of the Oolitic group, but in the south ward, gravels of the post tertiary period overlie the Jurassic rocks. The thick beds of hard stone met with in nearly all parts of the north and east wards have caused the excavations to be difficult and costly; but the stone was utilized in the construction of the roads and the concrete carriers on the sewage farm.

The pumps by which the sewage at the southern outfall is lifted into the gravitation main are two duplicate three-throw lift pumps, driven by two high-pressure, non-condensing horizontal engines of six horse-power. The normal speed of the engines when working with a boiler pressure of 45 lbs. is 100 revolutions a minute, and each pump, working at 20 double strokes a minute, will lift 400,000 gallons in 12 hours.

The sewage on arriving at the outfall is discharged into settling tanks, built in duplicate, and provided with wrought-iron strainers; passing from thence, the liquid sewage is conveyed in a concrete carrier to the land prepared for irrigation. On arriving at the land prepared for the reception of the sewage, the carrier divides into two smaller ones, from which the sewage is distributed over the irrigation area by land carriers. The larger concrete carrier is 1,098 yards in length, and has a water-way of 6.5 superficial feet. The two smaller carriers are 2,159 yards long, and have a sectional area of 4.8 superficial feet. The irrigation channels are 12 in. wide at the top, 6 in. at the bottom, and are 6 in. deep. All the carriers are laid in horizontal lengths, with sluices and drops at every change of level. The soil of the irrigation area is of a light alluvial character, overlying silt, and has a natural filtration and drainage of 4 ft.

As the farm is situated near the Bedford Level, and within the protection bank of the North Level Commissioners, the effluent water is not allowed to be carried off by their drains, except in dry seasons, and must consequently be lifted over the north bank into the new cut of the River Nene. This is effected by two 12-in. centrifugal pumps, driven by two 25 horse-power high-pressure condensing engines. The normal speed of the engines is 60 revolutions per minute, with a boiler pressure of 60 lbs. The cylinders are 1 ft. 4 in. in diameter, and the stroke is 2 ft. The fly-wheels are 10 ft. in diameter, and weigh 2 tons. Each pump, when making 400 revolutions per minute, will deliver over the bank 1,600,000 gallons in six hours. The boilers are Galloway's patent, with shells 18 ft. long by 6 ft. diameter.

The works were designed and carried out by Mr. John Addy, Assoc. Mem. Inst. C. E., of Peterborough, with Mr. John C. Gill, Assoc. Mem. Inst. C. E., as resident engineer. The contractors for the buildings were Messrs. S. and W. Pattinson, of Ruskington, near Sleaford, and for the engines, pumps, boilers, and machinery, Messrs. Seekings and Ellery, of Gloucester. The works on the main drainage and irrigation farm were partly executed by Messrs. J. S. Cooke & Co., and partly by the corporation.

BRAZILIAN EXCHANGE.

	Dec. 23, 1880.
Per value of the Brazilian mil reis (1$000) gold.	27 d.
" " " " in U. S. coin at $4 84 per £1. stg.	54 45 cents.
" $1 00 (U. S. coin) in Brazilian gold.	1$837
" of £1. stg. in Brazilian gold....	8$889
Bank rate of exchange on London to-day.....	22½ d.
Present value of the Brazilian mil reis (paper)	833 rs. gold.
" " " in U. S. coin at $4 80 per £1. stg.	44.98 cents.
Volue of $1.00 ($4.80 per £1 stg.) in Brazilian currency (paper).....	2$222
Value of £1 sterling in Brazilian cur'y (paper)	10$667

THE OBELISK.

It may be of interest to recall the following facts as to the dimensions of the obelisk. The main body of the shaft is 61 feet 7 inches high, and the pyramidion is 7 feet 7 inches long, in all 69 feet 2 inches. No two sides of the obelisk or of the pedestal are equal in breadth, and the sections through are trapeziums. At the base the obelisk is 7 feet 8¾ inches square through the axis, and at the top it is 5 feet 3 inches square. The weight is 219¼ tons net. The height of the pedestal is 6 feet 11 inches. At the base it is 9 feet 3 inches square through the axis, and at the top 9 feet 1 inch. The height of the bottom step of the foundation is 1 foot 5½ inches, and the width 1 foot 6 inches; the second step is 1 foot 7 inches high and 1 foot 2¼ inches wide, and the top step 1 foot 9½ inches high. At the base the foundation is 17 feet 8 inches square, and at the top 12 feet 3½ inches square, and weighs 87¾ tons. This makes the total weight and height of the monument as follows:

	Height.	Weight.
Obelisk	69 ft. 2 in.	219¼ tons.
Pedestal	6 ft. 11 in.	49 tons.
Foundation	4 ft. 10 in.	87¾ tons.
Total	80 ft. 11 in.	356 tons.

The height from the drive to the bottom of the foundation is 12 feet 1 inch, and the elevation from the site above mean high water is 101 feet 6 inches, which makes the height from mean high-water mark to the top of the obelisk 194 feet 6 inches.

GENERAL INTELLIGENCE.

☞ *We solicit and are always pleased to publish in these columns any items of interest that may be furnished us.*

GAS AND WATER.

The Trustees of the Springfield (O.) Water Works met Wednesday morning, the 12th, at the office of J. H. Thomas, for organization, when Geo. H. Frey, Esq., was chosen president.

Burlington, Vt., makes an excellent showing with its water-works system, the department having paid all its running expenses and the interest on its bonded debt and earned a surplus of $1,508.

The proposal of J. D. Cook, engineer, to serve the Board in constructing the works, at $2,500 per annum, was accepted, and the President of the Board authorized to notify Mr. Cook of the same.

Goodhue & Birnie, of Springfield, Mass., wish it understood that an investigation has proved that water-pipes connected with the Concord state prison which burst during the late fire were laid by the State and not by their firm.

The Phœnix Iron Company, of Phœnixville, are now heating their furnaces with gas manufactured from anthracite coal. This company has been experimenting for a long time, and has at last discovered the secret, which will add largely to the capacity of its works. The Siemens converters and furnaces are used in the process.

The Brooklyn aldermen on the 25th authorized the

expenditure of $100,000 for the increase of the water supply. Three or four months ago the Mayor and Commissioner of City Works authorized a contract for pumping water from Springfield brook and Watt's pond into the conduit leading from the storage reservoir at Hempstead to the distributing reservoir at Ridgewood, at the cost of $65,000. The sum voted on the 25th covers this and the cost of the ponds from which water is taken.

Marlboro, Mass., is discussing water-works; present opinion is unfavorable. It is thought, however, that another petition will be circulated, which will call for a special town meeting, to choose a committee to make additional surveys and estimates relative to the introduction of water. The committee of 15, chosen last February to investigate the matter, reports the probable cost of water introduction at from $83,000 to $100,000. Public sentiment is considerably divided in the matter, as a two-thirds vote would be required to introduce water.

On the 21st, at a meeting of the incorporators of the New Hartford, N. Y., water-works company, the following trustees were elected: R. U. Sherman, Morgan Butler, Sanford F. Sherman, New Hartford; E. A. Hammond and Joseph A Shearman, Utica. The officers elected were: R. U. Sherman, president, Morgan Butler, vice-president; S. F. Sherman; secretary; E. A. Hammond, treasurer. It is expected that the company will be able to commence operations as soon as spring opens, and that the work will be completed by the middle of the summer.

Engineer Birdsall, of the Department of Public Works, stated a few days ago that the recent heavy rains had largely increased the volume of water in the Croton River, and were steadily raising the level of the water in the large storage reservoirs at Boyd's Corners and other points. The increase in the storage reservoirs was slow but sure at the rate of three or four inches a day, and this would be equal to about a foot in the Central Park reservoir. The storage supply of water was very largely drawn upon last summer and fall, and these large reservoirs are not likely to be filled before the snow and ice melt or the spring rains set in. Mr. Birdsall, when asked if the additional aqueduct, tapping the Bronx River, would be ready by the time the World's Fair is held, replied that it would not; those having the work in charge did not believe that it could be completed and water admitted before the fall of 1883.

BRIDGES.

The City Engineer of Denver, Colo., is preparing specifications for two iron bridges across Cherry Creek, one at Curtis street and one at Colfax avenue.

The Wrought Iron Bridge Company, of Canton, Ohio, has been awarded the contract for the iron bridge, 1,560 feet long, across the Mississippi River at Plymouth Ave., Minneapolis, advertised in ENGINEERING NEWS, Nov. 6, 1880.

RAILROADS.

An international exhibition of railway plant and railway appliances is to be held at Berlin in 1881.

Old rails have gone up another $2 per ton all round. A report is current that the advance is the result of some kind of combination.

The Colebrook Valley Railroad Company has been organized in Lebanon. The new road, which will be eighteen miles long, will be constructed at once.

It is reported in connection with the Northern Pacific Railway that the Fargo & Southwestern Branch, 67 miles long, will be constructed during the coming year.

The contractors on the Rolling Fork extension of the same road have completed the grading as far as Arcola, and will finish the track laying to that point in a few weeks.

The Cedar Rapids, Iowa Falls & Northwestern road is to be known hereafter as the Cedar Rapids & Iowa Falls Division of the Burlington, Cedar Rapids & Northern.

The Hudson River Railroad is being straightened at Troy, N. Y. N. H. Decker has the contract. The length of the cut is 800 feet, and greatest depth 48½ feet. Cost, $15,000.

The track of the Richmond & Alleghany Railroad has been fully completed from Williamson's to Buchanan, Va., and trains are now passing over the line, a distance of about thirty-five miles.

A new feature in railroad building has been started by the Chicago, Burlington & Quincy in the manufacturing of a new material for balasting. It is formed of clay subjected to heat by bituminous coal.

Over 60,000 tons of steel and iron rails, principally for the Southern roads and the roads from the State line through Mexico to its capital and other points, have been sold abroad, all of which are to be shipped to Galveston, Tex.

An electric head-light for locomotives will soon be tried on the Cleveland and Pittsburg railroad. The power will be furnished by a small engine placed behind the smoke-stack and furnished with steam from the main boiler.

The Atchison, Topeka & Santa Fe road has bought 125 acres of land at Argentine, Kan., near Kansas City, and will make it their eastern freight terminus. Their round houses, coal-chutes and stock-yards will be concentrated at that point.

The first turnpike ever made in the United States was constructed between Philadelphia and Lancaster in 1792, and cost $500,000, a fabulously large sum in those days. The old turnpike between the latter city and Harrisburg was built in 1809.

A gold spike has been presented to the citizens of Lebanon by the hardware merchants of Cincinnati, to be driven in the last rail on the Cincinnati Northern Railroad, and which will give that town its first rail communication with the outer world.

Ben Smith, of Sioux City, Ia., has contracted with the Chicago, Milwaukee & St. Paul Company to cut 50,000 ties in timber on the Nebraska side, three miles south of the Vermilion. The ties will be laid on the new Gayville-Yankton Line and used in repairs on other parts of the Sioux City & Dakota Division.

Arrangements have been made to extend the Greenville, Columbus & Birmingham Railroad from Stoneville, Miss., to the Sunflower River, a distance of 20 miles. A locating party under T. S. Anderson, engineer in charge, will be put in the field immediately, and the work put under contract as soon as the surveys are made.

Two New Castle machinists have secured a patent for a new car wheel. The rim is cast in one piece of hard metal and the centre of soft metal. The interior circumference of the rim and the periphery of the hub are cast sloping, with a space between, in which a soft metal filling is run, uniting them solidly in one piece. When the flange is broken or the thread worn a new rim can be put on and the wheel is as good as ever.

The opinions of railroad engineers concerning the Fontaine locomotive are not more harmonious now than a month ago, yet the Canada Southern authorities are very sanguine as to its capabilities. It is doing good work every day between St. Thomas and Amherstburg. As soon as the weather becomes more propitious, its qualities will be tested, and one of its proprietors is quite enthusiastic as to its ability to run 90 miles an hour.

At a meeting of the directors of the Kansas City, Nebraska & Southern Railroad, held in Kansas City, Jan. 21, the following officers were elected: President, Kersey Coates; Vice-President, John A. Duncan; Secretary, W. H. Miller; Treasurer, S. B. Armour. The new road is to run northwest from Kansas City into Nebraska, and if the necessary county aid is received it will be constructed to the Nebraska State line in eighteen months.

The Mexican National Railway Company is pushing its work, and Gen. Palmer, President of the Denver & Rio Grande road, telegraphed from Denver to have two chief engineers with a corps of assistants sent to Manzanillo, the Pacific Coast outlet, and assist the corps sent out in November last. A large order was also given for supplies, including 4,000 tons of steel rails. It is intended to push the road through to Colima during the present working season.

It is thought that the next panic is to be of railroads. The great railroad crash in England, under Hudson, is recalled by existing speculation. Hudson used to make $500,000 a day by the rise of shares in the lines he controlled. In 1845, more than $600,000,000 were subscribed in England by all classes of the people for railroad shares; but the famine swiftly followed, and after $800,000,000 had been actually expended on railroads, a commercial panic began, followed by the Chartist riots in 1848.

The report of the Canadian Minister of Railways for 1879–80 says: One hundred and sixty-one miles of the Canada Pacific Railway are in operation, viz.: Emerson to Winnepeg and St. Boniface, 63 miles; St. Boniface to Selkirk, 22 miles, and from Selkirk to Cross Lake, 76 miles. The total earnings of the Canada Pacific for the four months and eighteen days of operation ending June 30 last were $104,975.69; the working expenses were $78,892.01; excess of earnings over expenditure, $26,083.68. The total amount of passengers carried was 17,640, and the amount of freight, 24,214 tons.

It is well understood by those in the secret, it is said in a Boston dispatch to the Hartford *Times*, that Chester W. Chapin of Springfield and the Boston & Albany are behind this scheme, and that the whole thing means a parallel railroad from Springfield to New York in the interest of the Boston & Albany Railroad. While the ostensible plan is to make connection with the Connecticut Valley and then open a boat line between Saybrook and New York, the real purpose is understood to mean something entirely different. It contemplates nothing less than an "air-line" from Springfield to New York. The route, as laid down by one who has been let into the secret, is as follows: Build a new line to Tariffville, utilize the Connecticut Western to Collinsville, build a short link to Litchfield, run over the Shepaug Valley road to Dayville, build across to the Harlem railroad, and thence enter New York by that line. This would give a line from Boston to New York entirely in the control of the Boston & Albany, 18 miles shorter than by Hartford & New Haven, and the trains would be run through between the two cities in five hours. This is believed to be the present programme.

The annual report of the Illinois Commissioner of Railroads has been published. Following are some of the principal features: "Work on new lines of completed road has progressed as follows: Chicago & Western Indiana, 23.56 miles; Chicago & Strawn, 92.20; Springfield, Effingham & Southeastern, 53.50; Danville, Olney & Ohio River, 23; Fulton County Narrow Gauge, 30; Jacksonville Southeastern, 22; St. Louis Coal Railroad, 9.25; Chicago & Grand Trunk, 25.86; making in all 346.74 miles of road built during the year." The capital stock account for 1880 is $408,745,914, against $339,387,110 in 1879. The amount of stock held in Illinois is $7,841,700, being $638,481 less than in 1879. The amount of stock issued per mile varies from $750 per mile, as reported on the Baltimore, Ohio & Chicago the lowest, to $69,400 per mile on the Michigan Central, the highest. The average for all the roads is $22,257. The principal additions to the amount of stock issued during the year are as follows: Alton, $275,700; Burlington, $21,210,670.51; Rock Island, $20,980,000 (doubled); the Danville Olney & Ohio River, $142,800; the East St. Louis & Carondelet, $120,000; the Havana, Rantoul & Eastern, $1,300, all common stock; Wabash, $4,000,000 common and $20,000,000 preferred stock, a total increase of $24,000,000 for that road. The construction and equipment account shows the average cost per mile of the roads reported to be $40,309. In every instance, with one exception, the stock and debt exceeds the reported cost of construction from $2,000 up to $16,500 per mile. The highest average cost per mile of standard roads reporting in the State is that of the Michigan Central, $126,289; the lowest, that of the Indianapolis, Decatur & Springfield, $10,070.

	Passenger.	Freight.	Net earnings per mile.
Alton	$2,750	$7,691	$4,899
Burlington	1,999	7,715	3,727
Northwestern	2,385	7,498	5,683
Rock Island	2,066	6,499	3,822
Illinois Central	1,372	4,185	3,050
Indianapolis & St. Louis	1,708	4,326	2,142
Ohio & Mississippi	2,140	4,359	2,077
Alton & Terre Haute	1,278	4,051	2,992
Wabash	1,435	4,344	2,063

RIVERS AND HARBORS.

The House Commerce Committee will incorporate in the River and Harbor bill probably $1,000,000 for the lower Mississippi and $200,000 for the reservoirs of the upper Mississippi.

The contracts for sixteen iron bridges were awarded on the 20th by State Engineer Horatio Seymour, Jr., to Thomas Leighton, of Rochester, and Melvin A. Nash.

About $7,500,000 has been spent on the Mississippi River, aside from the jetties, since the formation of the Government, out of $70,000,000 appropriated for the rivers and harbors of the country.

Thirty-eight fog sirens, worked by caloric engines, have now been established, at a cost of £50,000, around the coast of England and Wales, and appear to answer admirably the purpose they are intended to serve.

Last session Congress abolished the tolls on the canal around Louisville, Ky., making it a free national work. It appropriated the tolls on hand, some $30,000, for the improvement of the canal, but forgot to make an appropriation for its maintenance. No tolls are now collected. There is, therefore, no revenue for the canal.

The Secretary of War recommends the appropriation of $80,000 for the support of the canal for nine years.

Capt. Barker, of the Lighthouse Department, returned to the city yesterday. He met the lighthouse supply boat Fern in the Mississippi Sound. The Fern is making her annual tour. In the winter she visits the lighthouses on the Southern coast, and during the summer those on the Northern coasts. The Fern is expected at the mouth of the jetties in a day or so, and it is not at all unlikely that she will come up to the city. She is commanded by Capt. Wm. Wright, is about ten years old, is a propeller of about 500 tons burden, and is spoken of as a neat little vessel, well adapted for the service in which she is used.

Capt. Huer stated to a reporter yesterday that the work of building the lighthouse at the South Pass is being pushed forward. The piles for the foundation have already been sunk.

The iron work for the lighthouse at Fort Point, on Galveston Island, is expected to be shipped from New York on the 28th of this month. The Galvestonians can, therefore, look forward to the early completion of their lighthouse.—*New Orleans Picayune 25th.*

WASHINGTON, Jan. 20.—Senator Jonas and Judge Elam were before the Senate Committee on Commerce to-day in advocacy of the bill, which passed the House last session, to provide for the drainage and reclamation of the bed of Cross Lake, near Shreveport, La. They represented that the lake was of no commercial value and miasmatic, and that its drainage would be advantageous to the navigation of the adjacent waters of a twelve mile bayou and lakes between Shreveport and Jefferson, Texas. No definite action was taken to-day, but indications are that the bill will meet with favorable consideration of the committee.

The contract for dredging the bar at the mouth of Pascagoula River, under the first appropriation, was completed by Capt. S. N. Kimball, on the 17th, who went thence with his dredge to Cedar Keys, Fla., where he has another contract for dredging. The cut at present is 100 feet wide (except for about 400 feet about half-way down, where it is 75 feet wide) and seven feet water at low tide. The appropriation did not quite hold out to finish the canal through to 100 feet in width. There is another contract under the last appropriation of $20,000 awarded to Mr. Wm. G. Mitchell, which will be sufficient to complete the cut to 200 feet in width. Mr. Mitchell is to commence work by the first of next month, and we learn he will be here by that time.—*Pascagoula Star-Democrat.*

WASHINGTON, D. C., Jan. 17.—The different theories as to the best methods of improving the Mississippi River are embodied in the two following resolutions which were presented in the Commerce Committee of the House to-day. Mr. Acklen's resolution was as follows:

One million eight hundred thousand dollars for the improvement of the Mississippi River, to be expended by and

under the direction of the Secretary of War, in accordance with the recommendations, plans, and specifications and estimates, and under the advisory supervision of the Mississippi River Commission for the construction and repair, completion and preservation of the public works, recommended by them in their report to the Secretary of War, or of such of said works as they may select; $200,000 for the system known as the reservoir system, to be expended by and under the direction of the Secretary of War.

Mr. Kernan's resolution is as follows:

For the permanent improvement of the Mississippi River, in accordance with the plans therefor recommended by the Mississippi River Commission, to be expended by the Secretary of War, with the advice and under the supervision of said commission, the sum of $——, and it shall be the duty of said commission to take into consideration, and of the Secretary of War to extend operations under their supervision to the tributaries of the Mississippi River, to the extent, and no further, that may be necessary, in the judgment of the commission, to the perfection of the general and permanent improvement of said Mississippi River. But this clause shall not be construed to interfere with the prosecution by the War Department of the improvement of said Mississippi River and its tributaries under general appropriations made therefor.

The last resolution gives the recognition to the reservoir system which the representatives of the Upper Mississippi States desire.

The following statements will show the extent and progress of the works in charge of Major C. W. Howell, U. S. A., Corps of Engineers, in charge of the department at New Orleans.

Improving Bayou Teche—Contractor at work. No report received for December. Work of improving and the removing of obstructions to navigation about done.

Improving Pearl River above Jackson, Miss.—The first contract completed and work on second to be commenced as soon as weather permits.

Improving Amite River—No report received from contractor for December. High water prevented progress on work at last report.

Improving Harbor at New Orleans—Jno. Roy, contractor Third District, reports that 4168.68 square yards of river bed covered by cane mats during December. On December 19 lines parted holding triangle, and whole plant for launching mats carried down the river. No work done since.

J. E. Slaughter, contractor Carrollton division, reports that he is building scows. Rains prevented hauling of piles. Construction of plant will be pushed when the weather becomes favorable.

Improving Sabine Pass, Texas—Dredging operations on the bar continue. Capt. Elwell reports channel widened and deepened.

Resurvey of Bayou Courtableau—Field work completed, chart plotted and report written to Assistant Engineer, and papers will be forwarded to Washington as soon as tracing can be made.

Improving Vermilion River—Contract will be made with Mr. O. A. Meyer for improving 22 miles of the river from the railroad bridge on proposal approved by Chief of Engineers.

Improving Tangipahoa River—Heavy rains and full river prevented work.

Improving Bayou Lafourche—Removal of logs, snags and stumps from the bayou was continued until December 13, when high water caused suspension of work, which will be resumed when the water reaches the proper stage again.

Improving Pearl River below Jackson, Miss.—Contractor reports flats all ready, but high water prevents commencement of operations.

Improving Bayou Terrebonne—The dredge-boat Samson was hired and a screw placed on board Dec. 23, 1880, and on the 28th the work of widening the bayou was commenced at a point about twenty-three miles below Houma, and are still at work.

Examination of Bayou Black—The assistant engineer in charge of the work expects to have it completed by the 15th of January. Is at work on the chart.

Survey of Atchafalaya River—The field work has been carried forward to Butte la Rose, including Grand River, from the Atchafalaya to Black Bayou.

Survey of Bayou Plaquemine—Field work completed to within one and a half miles of head of bayou. Remainder will be done as soon as possible.

Survey of Grand Lake—Survey will be made by the party now engaged on Atchafalaya River as soon as they reach Grand Lake.

Examination of Calcasieu River—Report of Assistant Engineer A. C. Bell forwarded to Chief of Engineers on January 10. Chart will be sent as soon as tracing can be made.

Survey of Lake Pontchartrain—Final report forwarded as soon as possible. Work has been completed.

Examination of Bayou Fusilier has not yet been commenced, but will be as soon as survey party is available. The examination of Bayous Little and Grand Caillou, Pass and Bayou Manchac, West Pearl River, Bogue Falilia and Bogue Chitto rivers will also soon be commenced.

Survey of Barataria Bay, from New Orleans to Grand Pass and the examination of Little Lake—Field work was completed Dec. 14, and plotting of field notes commenced Dec. 16. Work still in progress.

Examination of Bayou André—Field work completed. Field notes will be plotted on completion of office work for Barataria Bay. Report of assistant engineer has been finished.

Forts Jackson and St. Philip have been supplied with laborers for cutting grass and weeds on slopes. No general operations.

Major Howell says that excessive rains and high water have interfered with all the works under his charge to a great extent.

NEW PROJECTS.

The Lake Shore will soon begin building their new line from Fayette, terminus of their Chicago & Canada Southern division, to Chicago.

Amended articles of association of the Mitchel, French Lick & Dubois Railroad were filed with the Indiana Secretary of State, January 25.

The House Committee on Commerce has voted to make an appropriation for Mississippi River improvements and for the reservoir system.

Arrangements have been completed with Eastern capitalists to build a railroad from Des Moines to connect with the Wabash as a main line to St. Louis.

Track-laying has been begun on the railroad between Norfolk, Va., and Elizabeth City, N. C. It is to be 44 miles long. All but $25,000 worth of it is owned by Northern capital.

The Senate Committee on Commerce will report favorably Mr. Conkling's bill authorizing the construction of a railway bridge across the Niagara at Grand Island, near Tonawanda.

The branch of the Union Pacific from Echo, on the line of the Union Pacific, to Park City, U. T., has been incorporated as the Echo & Park City Railroad, the stock being placed at $500,000, divided into 5,000 shares.

A corporation has been organized at Fairfield, Ia., to be known as the Salem and Northwestern Railroad Company. The object is to build an extension of the Keokuk Railroad north from Salem to Fairfield and on northwest.

Articles of incorporation have been filed for the Potsdam & Montreal Railway. The road will extend from the Rome, Watertown & Ogdensburg Railway at Norwood to the boundary line of New York State. The capital is $500,000. This will be an an extension of the South Shore Air Tunnel Company.

DENVER, Col., Jan. 28.—Several days ago the Grand Canon Coal Company struck oil at a depth of 1,445 feet, near Canon City. Boring had to be stopped until a pump could be put in. The well now yields from five to six barrels of oil per day, and it is thought that by boring it deeper it will yield a greatly increased volume.

The Denver & New Orleans Railroad has filed articles of incorporation, the object being the construction of a railroad from Denver to connect with the Texas Pacific, Houston & Texas Central and Rio Grande extension of the Missouri, Kansas & Texas Railroad in Texas. The capital stock is $10,000,000.

The New York, Boston, Albany & Schenectady Railroad Company executed on the 20th to the Farmers' Loan and Trust Company of New York a mortgage on all its property and franchises to secure the issue of $6,000,000 of 6 per cent. first-mortgage gold bonds for the construction of a line of road from New York to Albany and Schenectady on the east side of the river.

An agent of the Central Railroad has arrived at Paso del Norte, who announces that work will begin on the Mexican side as soon as the Atchison, Topeka & Santa Fe road reaches the Rio Grande. Work on the Matamoras & Monterey Railroad has been suspended since Dec. 22, for some reason unknown. The Sullivan Company has purchased the railroad from Zacatecas to Guadalupe.

The Denver Railroad Construction Company (capital $1,000,000), which has secured the contract to build and equip the Denver, Utah & Pacific Railroad, has issued a circular in Colorado urging the capitalists of that State to subscribe for half the capital stock. The circular says that it is intended to have the road completed and the cars running from Denver into Middle Park by the last of the present year.

The Houston *Telegraph* says: "The Narrow Gauge road is to be completed at Waco by May 24, and will be pushed on to Mexico and the Pacific coast. A branch road will also connect with Galveston. The City Council of Waco has granted right of way through South Waco. This company has a capital of between six and seven million dollars, and is determined to make it a first-class road in every sense of the word."

The "Merchants Telegraph Company" has been formed in Chicago, to run a line of wires between New York and Chicago. Capital, $1,000,000. The corporators are N. K. Fairbank, George L. Dunlap, George C. Walker, S. A. Kent, H. W. King, Perry H. Smith, J. B. Lyon and Samuel Johnson. The intention is to run four or five wires, which can be put in operation for $500,000. The head office is in Chicago.

The House Committee on the Interoceanic Canal on Wednesday heard a letter from Captain Eads in reply to the one of Admiral Ammen, the letter inclosing communications from Naval Constructor Hartt, Henry Flad, of St. Louis; Superintendent Chanute, of the Erie Railway; General Gilmore and Commodore Shufeldt—that of the latter inclosing an extract from Commander Farquhar—indorsing the practicability of the ship railway across Tehauntepec.

Articles of incorporation of the New Mexico & Rio Grande Railway Company were also filed with the Secretary of State at Denver, Col., on the 22d inst. The capital stock is $1,000,000, and the company is organized for twenty years. The base of operations will be in Arapahoe County, Col., and in Socorro County, New Mexico. The principal office will be in Denver. The trustees of the company are A. P. W. Skinner, Joseph W. Riggs, B. S. Knowlton, Frank A. Robertson and Theodore F. Brown.

The American Telegraph and Cable Company has been incorporated, with a capital stock of $20,000,000, for the purpose of laying and operating cables between New York and Europe, the West Indies and South America to Honolulu, and from there one cable to Japan and one to Australia. Two of the cables to be laid between this country and Europe are now in process of construction by Siemens & Co., of London. The incorporators are identified with the American Union Telegraph Company.

The surveying corps of the northern line of the Indiana, Bloomington & Western extension eastward announce that the surveys between Indianapolis city line and Springfield, O., are completed, and ask for instructions. Orders were given on Monday that they prepare a map and profile of the route as soon as possible, that it may be submitted to the directors for action. The projectors propose to have the road in operation between Indianapolis and Columbus, O., by Dec. 1. Grading will be commenced as soon as the line is decided on.

A dispatch from Sturgeon Bay, Wis., says: "A company, consisting of Timothy O. Howe, D. M. Kelly, Henry Strong, E. A. Ellis, M. P. Skeels and William Hoffman, of Green Bay; L. M. Marshall, Levi Howland and George Richardson, of Fort Howard, has been formed for the purpose of building a narrow-gauge railroad from Green Bay to the northern extremity of the peninsula, a distance of eighty miles. It will be known as the Wisconsin Peninsular Railroad Company. The capital stock is $1,600,000. A part of the distance has already been surveyed."

JACKSONVILLE, Fla., Jan. 27.—A contract has just been agreed upon between the authorities of Florida and I. Coryel, of Jacksonville, and A. B. Linderman, representing capitalists of Philadelphia and the Pacific coast, to drain Lake Okeechobee, in South Florida. If the scheme is carried out 12,000,000 acres of the best sugar land in the world will be reclaimed. The territory to be reclaimed includes the celebrated Everglades, and is twice as large as the State of New Jersey. This is the largest contract on record, and if it is completed Florida can produce more sugar than the United States now consumes.

A Columbus, O., dispatch says a new and important line of railroad has just been chartered. It is to run from Marion, O., *via* Kenton, Waupekhenetta, or Lima and Bluffton, and Huntington, North Manchester, Rochester, Maxanoukie Lake, Knox, Valparaiso, etc., to Chicago. This is to form the outlet for the Erie road. It is to be first-class in all its parts, and constructed with steel rails. At Marion it will connect with the New York, Pennsylvania and Ohio, Chicago, Cleveland, Columbus & Indianapolis, and Columbus & Toledo roads. The bonds have been disposed of in England, and the road will be completed next year if possible.

A Grand Rapids, Mich., dispatch announces that the Chicago & West Michigan Railroad Company substantially concluded the details and contract on the 23d for the purchase of the Grand Haven Railroad, a line 57 miles long, from Muskegon to Allegan, and the Grand Rapids, Newaygo & Lake Shore Railroad, from Grand Rapids to White Cloud, 46 miles long. At White Cloud the Newaygo Road has a junction with the Muskegon & Big Rapids branch of the Chicago & West Michigan. The details of the price paid are not reported yet. The two roads, in stocks and bonds, represent a little more than $3,000,000. It is supposed, too, that the Newaygo road will soon be extended northwest, perhaps to Manistee.

Mr. J. T. Dodge, civil engineer, in charge of the Yellowstone Division of the Northern Pacific, is soon to report the result of his surveys in the Yellowstone Valley. He has had, most of the time, three locating parties in the field since May 1 last. These parties have run over 800 miles, including preliminary and located lines. Two lines from Glendive to Miles City, four lines from Miles City to the Big Horn, and two lines from the Big Horn to Coulson. From Miles City to the Big Horn the valley has been thoroughly examined on both sides of the river. The line of the road is located and adopted from Miles City on the south side of the river. From thence to the Big Horn the line of location will shortly be decided upon.

On Thursday a committee of Rochester business men consisting of William Purcell, E. V. Chase, F. Cook, Martin Briggs, George C. Buell and J. E. Booth, representing the commission appointed by Legislature, met Mr. Vanderbilt at the Windsor Hotel, and decided that the best thing to do was to build an elevated road to carry the trains twelve feet above the thirty streets which the New York Central Road crosses in passing through Rochester. This plan can be easily carried out on account of the steep grades which are encountered on both sides of the city. The work will be begun early in the spring; it will take about three years to complete it. The cost will amount to between $1,000,000 and $2,000,000.

The Delaware & Hudson Canal Company propose to build at once a branch road from Glens Falls to Lake George, N. Y. Estimates and surveys have been completed. The road will cost $300,000. It will start near the present site of the Glens Falls depot, run northwesterly to Glen Lake, crossing the lower end of the lake on a trestle, and continue up the ravine to French Mountain, where a depot will be built. Leaving this point the road will continue up to old Fort George. A depot will also be established at this point. The depot will be situated at the southern extremity of Lake George, between the Fort William Henry and Seeley hotels. A dock will be constructed near the depot, giving a sufficient depth of water in front of it to allow the steamers to land there.

The Greeley, Salt Lake & Pacific Railway Company filed articles of incorporation with the Secretary of State January 17. The object of the company is to build, maintain and operate a railroad from Greeley, Col., to Fort Collins; thence up the valley and through the cañon of Cache la Poudre to Salt Lake City; also a branch from Fort Collins to the Marshall coal banks in Boulder, and thence to Denver; also a branch from Fort Collins to Erie, and thence to Denver. The capital stock is $500,000, divided into 5,000 shares of $100 each. The incorporators are John J. Bush, of Fort Collins; Junius Berkley, of Boulder, and A. A. Egbert, C. W. Fisher and Willard Teller, of Denver. The directors for the first year are: Sidney Dillon, Jay Gould, John Evans, C. W. Fisher, A. A. Egbert, Willard Teller and John J. Bush. The principal office is in Denver, with a branch in New York.